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SNCAST: Seismic Network Capability Assessment Software Tool for Regional Networks: Examples from Ireland

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Event detection capability plays an important role in the operation of seismic networks. The magnitude detection threshold of seismic networks is frequently derived from the observed magnitude of completeness. However, the latter might be unknown for regions that have not been monitored previously or where the observed seismicity rate is low. We present the python program SNCAST with which the geographical distribution of event detection capability can be calculated as a function of station coordinates and station ambient noise amplitudes. The method employs the local magnitude scale and hence is mainly applicable to regional networks with an aperture of less than about 1000 km. SNCAST can easily be employed to determine network performance in near real-time if station data streams are available. It can also be used for designing the geometry of new networks or assessing the effect of adding or removing stations from an existing network. We present examples from the Irish National Seismic Network which operates in a region with low seismicity and large variations in ocean and wind generated seismic noise. The seismicity in Ireland is too low to allow the calculation of a magnitude of completeness for comparison with the derived capability maps. However, the maps are in good agreement with the location and magnitude of detected local and regional earthquakes demonstrating that SNCAST is a reliable tool for assessing the detection capability of seismic networks.